

**Abstract**

The photonic network of an embodiment of the present invention uses a cost-effective DWDM optimized switch architecture allowing the introduction of DWDM into the metro network. In order to implement this architecture cost-effective ways of implementing the optical carrier frequency/wavelength precision required for a Dense Wavelength Division Multiplexing 100 GHz or 50 GHz on-grid solution are needed. In prior art solutions, all optical carriers are locally generated at the access point, precluding wavelength locking and/or low cost bulk precise optical carrier generation. In this invention the optical carriers are all generated in the photonic layer at the edge photonic switching node and are allocated out to the photonic access nodes or central core data switch for modulation. This has the advantage of providing the optical carriers to be modulated from a centralized highly stable and precise source, thereby meeting the requirements for DWDM carrier precision, whilst generating these carriers in relatively close proximity to the modulators. Sparse WDM components can be used in the access portion of the network without adversely affecting the ability of the signal to transit the DWDM portion of the core network, since the optical carrier frequency is fixed at the centralized source and is unaffected by these components.